

Two new *Pristimantis* (Anura, Strabomantidae) belonging to the *myersi* group from the Andean slopes of Ecuador

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Two new *Pristimantis* (Anura, Strabomantidae) belonging to the *myersi* group from the Andean slopes of Ecuador. - *Pristimantis onorei* sp. nov. and *Pristimantis lucidosignatus* sp. nov. are described from the eastern versants of the Andes in Ecuador. Both species are members of the *Pristimantis myersi* group. *Pristimantis onorei* sp. nov. is easily distinguished from other *Pristimantis* by having prominent W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region, lack of large cream spots on venter and by uniform light brown anterior and posterior surfaces of tights. *Pristimantis lucidosignatus* sp. nov. is unique among other *Pristimantis* of the *myersi* group in the following combination of characters: lack of narrow lateral fringes on fingers; prominent W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region; presence of flash spots on shanks; no large cream spots on venter; anterior and posterior surfaces of tights uniform light brown, prominent light markings on tibia. The two new species extend the *P. myersi* group to 13 known members.

Keywords: Amphibia - Strabomantidae - Systematics - *Pristimantis onorei* sp. nov. - *Pristimantis lucidosignatus* sp. nov. - Ecuador

INTRODUCTION

The Andes of Ecuador in South American harbor one of the most diverse anuran fauna, whereby members of the family Strabomantidae (former *Eleutherodactylus*) make up a major part. Until 2007 the genus *Eleutherodactylus* was with more than 700 recognized species one of the larger vertebrate genera (Wells, 2007). Recently, Heinicke *et al.* (2007) reassigned species of *Eleutherodactylus* into the three genera *Craugastor*, *Eleutherodactylus* and *Pristimantis* based on a genetic study comprising 280 species. Later, La Marca (2007) recognized two new genera of high Andean Venezuelan brachycephalid frogs, *Mucubatrachus* and *Paramophrynella*, but these were more recently treated as synonyms of *Pristimantis* within the family of Strabomantidae by Hedges *et al.* (2008), who presented a completely new classification for the frogs formerly comprising the family Brachycephalidae (sensu Frost *et al.*

2006). Following Hedges *et al.* (2008) classification all Ecuadorian strabomantid frogs fall within the genera *Barycholos*, *Isodactylus*, *Lynchius*, *Noblella*, *Oreobates*, *Pristimantis* and *Strabomantis*. Reviewing material housed at the Muséum d'Histoire Naturelle, Genève, we identified two new species that can be assigned to the genus *Pristimantis*. The frogs described herein were collected by L. A. Coloma and G. Onore between 1984 and 1985 at mid elevations in the Cordillera Occidental, Ecuador. Discoveries of species new to sciences within this region are even more common today than in the past (Coloma, 2005-2007; Fig. 1).

MATERIAL AND METHODS

Vouchers were preserved in ethanol (70 %). Diagnosis and description follow Lynch & Duellman (1997). All measurements were taken with calipers to the nearest 0.1 mm. Abbreviations for measurements are: SVL = snout-vent length; TiL = tibia length; FeL = femur length; TaL = tarsus length; FL = foot length; HeL = head length; HW = head width; Ind = internarial distance; IOD = interorbital distance; EN = eye-nostril distance (straight line distance between anterior corner of eye and nostrils); ED = horizontal eye diameter; ETS = eye-tip of snout distance (straight line distance between the anterior corner of eye and tip of snout); TD = horizontal tympanum diameter. Sex was determined by inspection of vocal slits.

For comparison we examined alcohol-preserved specimens from the herpetological collections of the Muséum d'Histoire Naturelle, Genève, Switzerland (MHNG), and the Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany (ZFMK).

Pristimantis festae. – Ecuador, Napo, Paralgacta, MHNG 2390.56-57.

Pristimantis simonbolivari. – Ecuador, Bolivar, Cashca Totoras, MHNG 2637.039-041.

Pristimantis unistrigatus. – Ecuador, Páramos near Quito, ZFMK 47377; Ecuador, 60 km S Quito, 4000 m, Paramó ZFMK 45764.

DESCRIPTION

Pristimantis onorei sp. nov.

Figs 2, 3, 4

Onore's Rubber Frog

HOLOTYPE: MHNG 2392.25, a ♂, collected at Tandapi, Pichincha, Ecuador, approximately 78.91°W, 0.54°S, 2,115 m a.s.l., by L. A. Coloma during December 1984 (Fig. 5).

PARATYPES: MHNG 2392.26, a ♀, collected at San Francisco de Las Pampas, Cotopaxi, Ecuador, approximately 78.96°W, 0.43°S, 1,711 m a.s.l., by L. A. Coloma during December 1985. – MHNG 2710.24 a ♀ and MHNG 2710.25, a ♂, collected at Santo Domingo de Los Colorados, Pichincha, by G. Onore during February 1984. Although the label attached to the specimen states that it was collected at Santa Domingo de Los Colorados, it remains unclear if the city at approximately 79.15°W, 0.25°S, 543 m a.s.l. was indicated or another place within the county Santo Domingo de Los Colorados (approximately 79.42 – 78.83°W, 0.04 – 0.51°S, 200-1700 m a.s.l.).

ETYMOLOGY: The specific name is a noun in the genitive case and is a patronym for our colleague, G. Onore, who collected large parts of the type series.

DIAGNOSIS: The species can be assigned to the *Pristimantis myersi* species group sensu Hedges *et al.* (2008) characterized by being small (♀ less than 28 mm

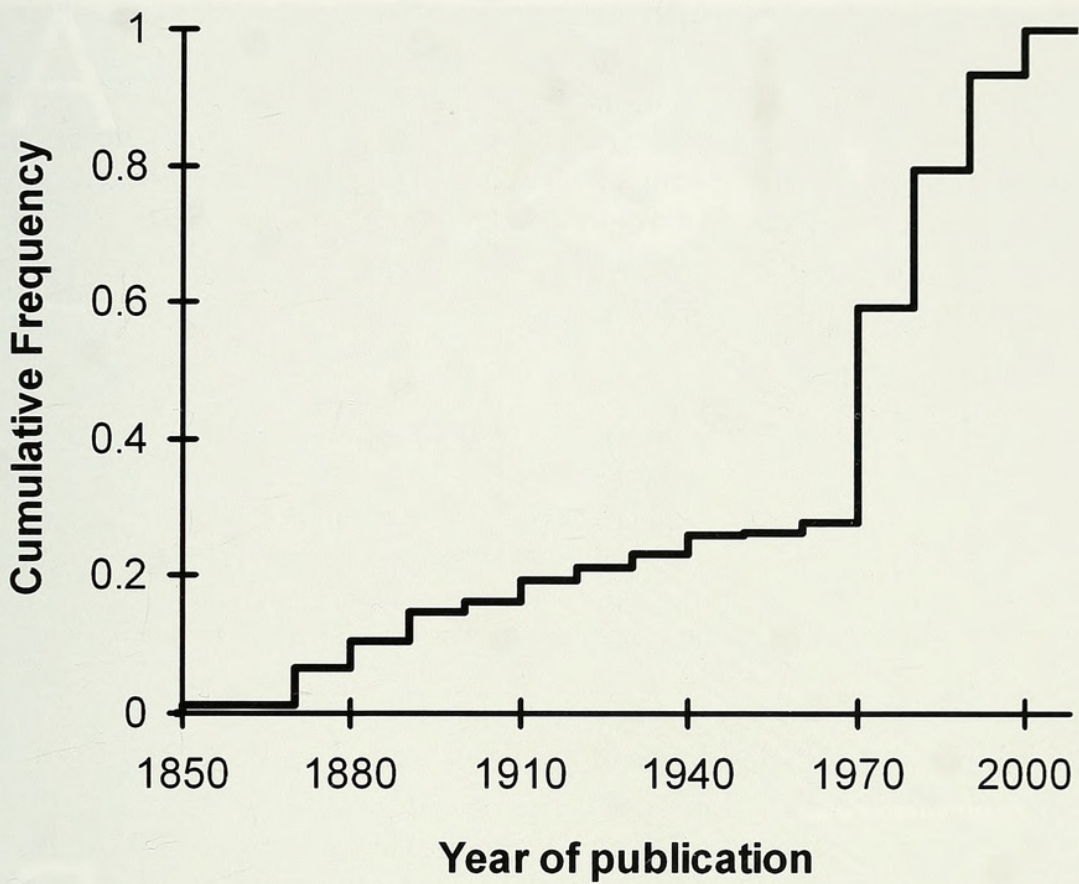


FIG. 1

Cumulative frequency of strabomantid frogs described from Ecuador. Source: Coloma (2005-2007).

SVL) with short snouts and relatively narrow heads, robust bodies, and short to moderately long limbs. Finger I is shorter than Finger II, and Toe V is only slightly longer than Toe III and does not extend to the proximal edge of the distal subarticular tubercle of Toe IV. Digital discs are narrow and rounded. The tympanic membrane is differentiated (except in *P. leoni* and *P. ocreatus*). Cranial crests are absent, vocal slits present (except in *P. floridus*). Vomerine teeth are present.

Pristimantis onorei has (1) skin on dorsum, upper flanks and limbs tubercular, that on venter finely areolate; weakly developed W-shaped occipital-scapular ridge, rest of dorsum covered with numerous interrupted dermal ridges; some large conical warts on upper eye lid and posterior parts of the tympanic region; dorsolateral and discoidal folds absent (2) tympanum completely concealed beneath the skin in ♀♀, oval and well developed in ♂♂, supratympanic fold absent; (3) snout rounded to slightly subovoid in dorsal view, acuminate in profile; canthus rostralis concave, edge distinct; (4) upper eyelid with one to two prominent, conical tubercles and irregularly scattered smaller tubercles; (5) choanae elliptical, slightly larger than nostrils; small but distinct detingerous process of vomers posterior and medial to choanae; tongue round, filling the whole mouth; (6) ♂♂ with short vocal slits and a external subgular vocal sac; (7) Finger I slightly shorter than Finger II; (8) fingers without lateral keels; (9) axillary

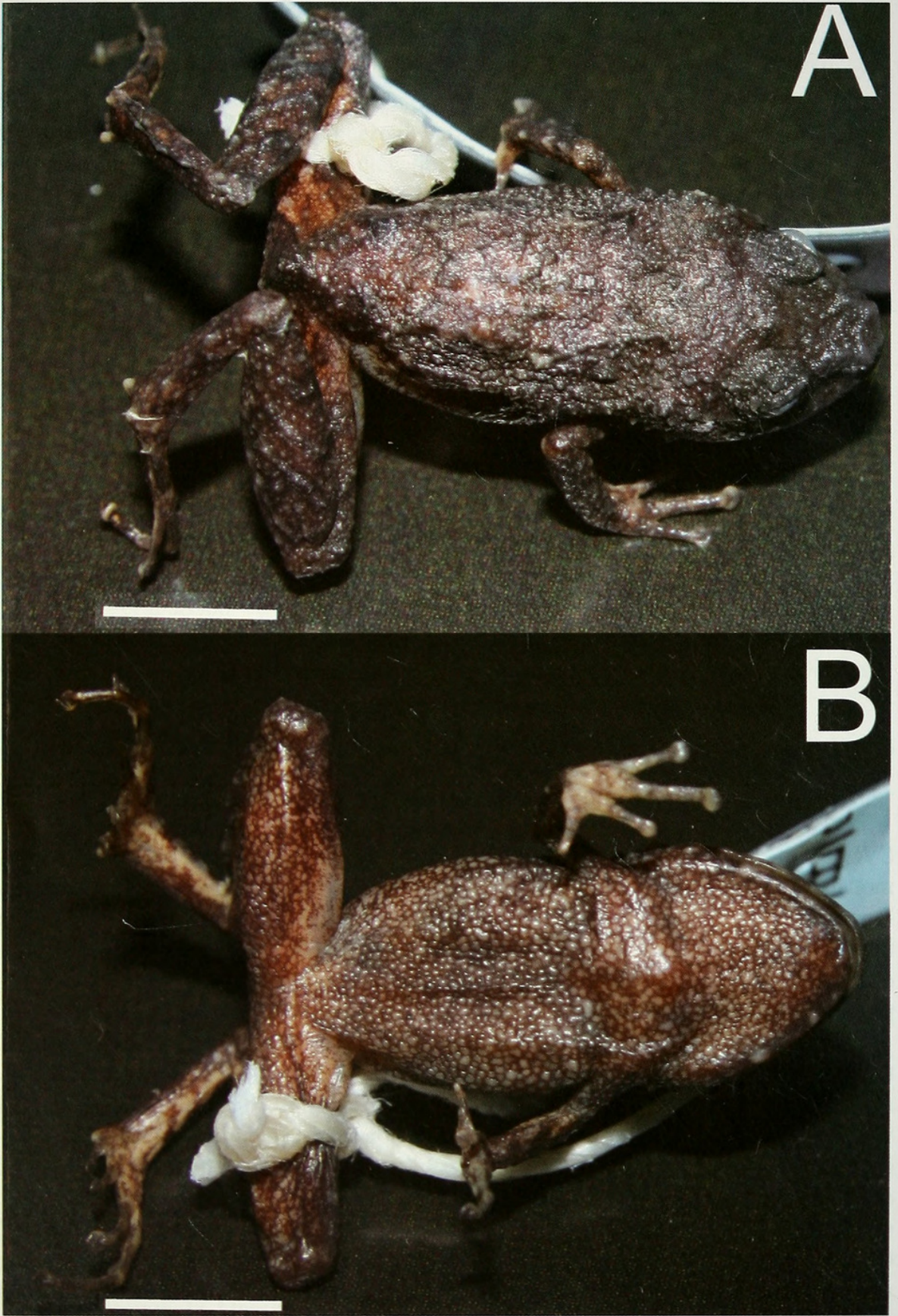


FIG. 2

♀ holotype (MHNG 2392.25) of *Pristimantis onorei* sp. nov. in lateral (A) and ventral view (B). Scale 10 mm.

tubercle absent; (10) ulnar tubercles present; (11) calcars absent; (12) inner metatarsal tubercle elliptic, protruding, outer metatarsal tubercle half the size of inner metatarsal tubercle; (13) toes with weak lateral keels; no webbing; Toe IV with small round disc, twice the size of disc on Toes I, II, III, and V (Fig. 3); (14) in preservative, dorsal and dorsolateral ground color brown with scattered darker spots, limbs dark banded, two darker subocular stripes radiating from lower eye lid to upper lip present; ventral coloration light brown; anterior and posterior thigh surfaces uniform brown lacking spots; (15) SVL 20.1 and 20.5 mm in ♀♀, 17.1 and 20.1 mm in ♂♂.

Pristimantis onorei is unique among other *Pristimantis* of the *myersi* group in the following combination of characters: tympanum completely concealed beneath the skin in ♀♀, oval and well developed in ♂♂; weak W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region; no large cream spots on venter; anterior and posterior surfaces of thighs uniform light brown.

COMPARISON WITH OTHER SPECIES (conditions of *P. onorei* in parenthesis): *Pristimantis onorei* is most similar to *P. leoni* and *P. ocreatus*. The former has a partly concealed tympanum beneath the skin (completely concealed beneath the skin in ♀♀, distinct in ♂♂), small tubercles on the heel (absent), and cream spots on venter (absent), and a brown barred throat (uniform brown). *Pristimantis ocreatus* lacks vomerine odontophores (present), has a reddish brown middorsal stripe or a broad dorsal band (absent), white spots on flanks and stomach, pale spots on surfaces of posterior thighs (uniform light brown). Despite a distinct tympanum present in ♂♂ and ♀♀, *P. pyrrhomerus* is most easily confused with this species, but can be separated by lacking digital discs or pads on Finger II and Toe II (present). Furthermore, preserved specimens of *P. pyrrhomerus* have colorless areas in axial, groin and on anterior and posterior surfaces of thighs, which are bright red in life (only present in groin, posterior and anterior surfaces of thighs light brown), and a cream venter with brown reticulation (light brown with minute cream spots). *Pristimantis onorei* can be easily distinguished from *P. festae*, which has only small finger discs (larger), white spots on venter, throat and in groin in preserved specimens (absent), and lacks well defined dermal ridges on the dorsum (present). *Pristimantis floridus* has larger digital discs (smaller), an indistinct supratympanic fold obscuring the upper edge of the tympanic annulus (no supratympanic fold), and a shagreen dorsum with many rounded warts without dermal ridges (no warts, many dermal ridges). *Pristimantis gladiator* has small heel tubercles (absent), a cream flecked venter with brown flecks (brown), and a yellowish throat (brown). *Pristimantis hectus* shows prominent dorsolateral folds (absent) and lacks upper eye lid tubercles (present). *Pristimantis repens* has a finely shagreen to tuberculate dorsum lacking dermal ridges (present) and cream flecks on posterior thigh surfaces, throat, chest and anterior venter (no cream flecks). *Pristimantis xeniolum* has a shagreen dorsum lacking dermal ridges (present). *Pristimantis lucidosignatus* sp. nov. has a much stronger developed W-shaped dorsal ridges (weaker developed) and light spots on shanks (absent).

DESCRIPTION OF HOLOTYPE: Snout outline rounded to slightly subovoid in dorsal view, acuminate in profile; head weakly distinct from body in dorsal view, HW 38.8 % SVL; canthus rostralis concave, distinct; nostrils slightly protuberant, directed

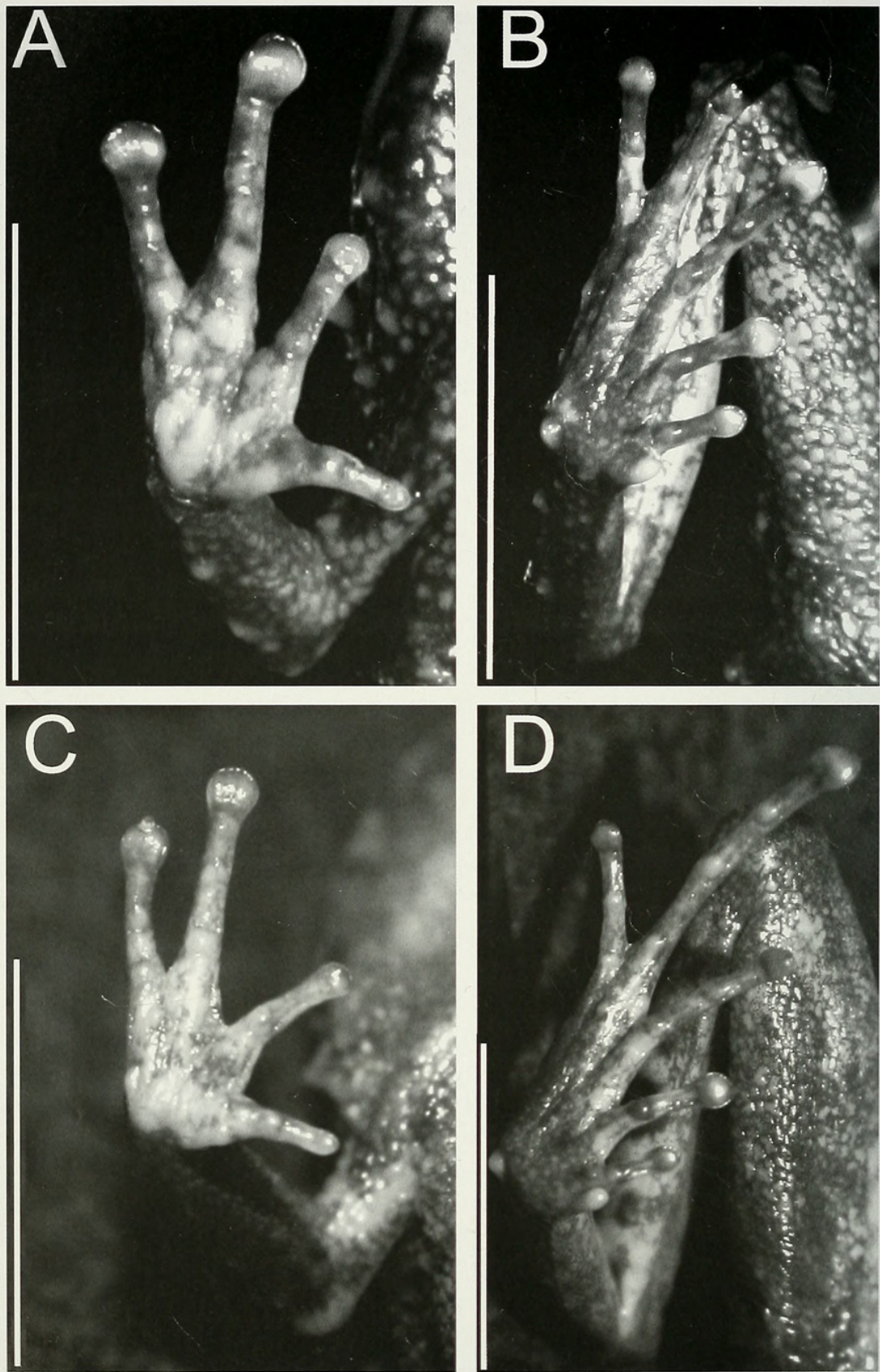


FIG. 3

Hand (A) and foot (B) of the preserved holotype of *Pristimantis onorei* sp. nov. (MHNG 2392.25) and hand (C) and foot (D) of the preserved holotype of *Pristimantis lucidosignatus* sp. nov. (MHNG 2392.27). Scale 5 mm.

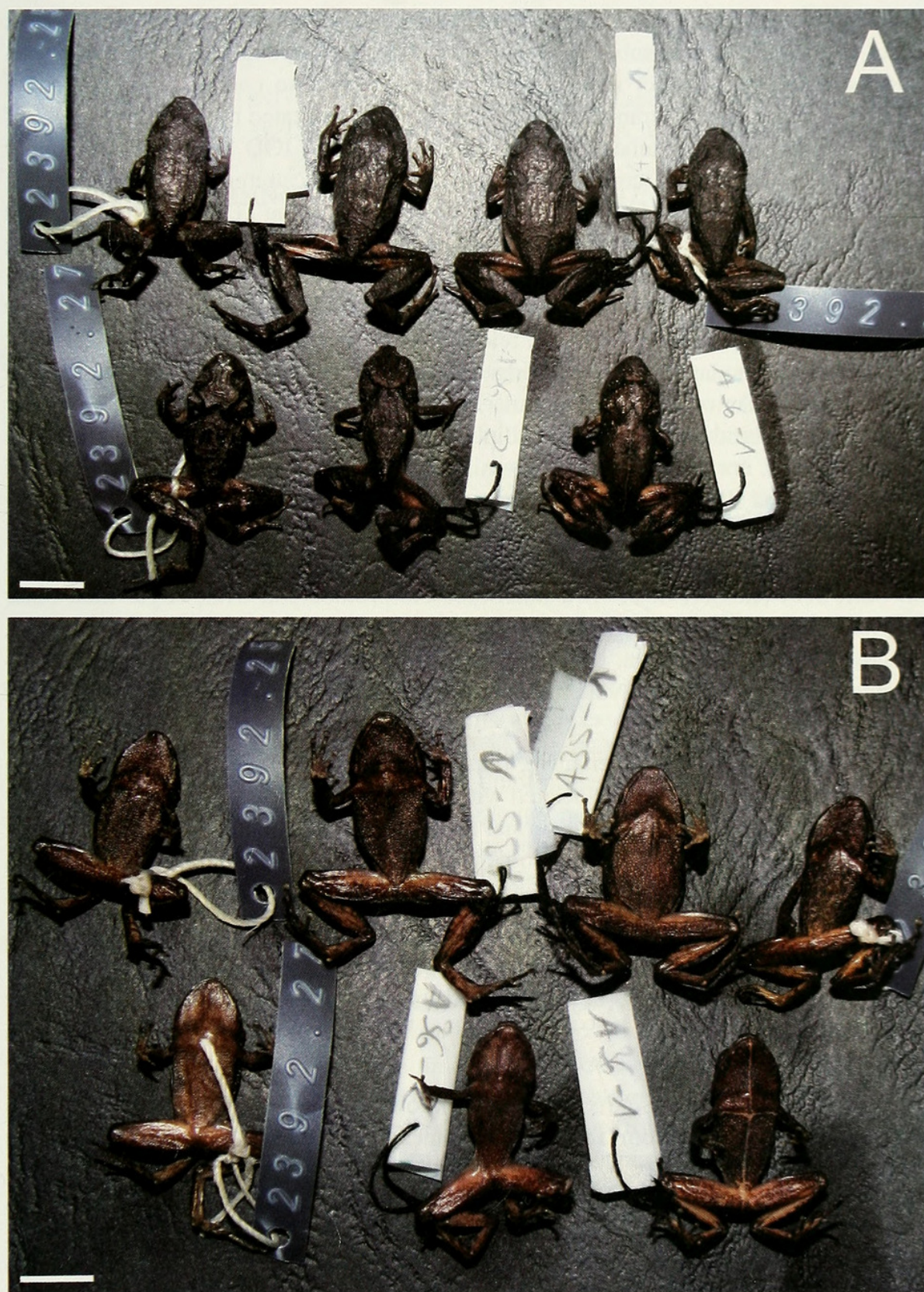


FIG. 4

Type series of *Pristimantis onorei* sp. nov. (upper row, holotype left) and *Pristimantis lucidosignatus* sp. nov. (lower row, holotype left). Scale 10 mm.

laterally; loreal region concave, interorbital space flat, no cranial crests; ♂♂ with short vocal slits and external subgular vocal sac; choanae elliptical, slightly larger than nostrils; small but distinct vomers posterior and medial to choanae; tongue round, filling the whole mouth; cranial crests absent; nostrils separated by a distance of $1/2$ of IOD; eyes large, their diameter slightly smaller than EN; IOD 88.5 % of ED; upper eyelids with prominent, conical tubercles and many scattered, smaller tubercles; distinct in ♂♂, separated from the eye by a distance of $2/3$ the TD; supratympanic fold absent, somewhat larger tubercle posterior of the tympanic region; skin on dorsum, upper flanks and limbs tuberculate, covered with many longitudinal interrupted dermal ridges; weakly visible W-shaped ridges extending from the posterior eyelid to scapular region; skin on venter finely areolate; relative length of adpressed fingers $I < II < IV < III$, not webbed, no lateral fringes or ridges; finger discs round, only slightly wider than finger; largest disc on Finger III; palmar and thenar tubercle well developed, palmar tubercle partly bifid, thenar tubercle elliptical and elongated; subarticular tubercles as broad as finger, not protruding; two prominent supernumerary tubercles at the base of Fingers III and II, numerous smaller supernumerary tubercles; two small ulnar tubercles; relative length of adpressed toes $I < II < III < V < IV$, unwebbed, no lateral fringes or ridges, discs round; disc of Toe IV equal in size to disc of Finger IV, those on other toes smaller; inner metatarsal tubercle protuberant, oval, larger than outer tubercle; outer metatarsal tubercle ovoid, $1/3$ of the size of inner metatarsal tubercle, subarticular tubercles round, equal or slightly smaller to toe width and slightly protruding; only few scattered supernumerary tubercles; calcars absent; TiL 45.3 % of SVL.

COLOURATION: In preservative, dorsal ground color uniform dark brown with scattered darker spots, often associated with dermal ridges; some more prominent darker markings along the W-shaped dermal ridge and a somewhat darker interocular bar present in some specimens; flanks somewhat lighter than dorsum; ventral coloration light brown; crossbars on the forearms and the shanks present; anal triangle somewhat darker than dorsum, indistinct.

VARIATION: Coloration patterns are quite similar among our sample, however the venter of MHNG 2392.26 is somewhat dark marbled. The tympanum is completely concealed beneath the skin in ♀♀, but oval and well developed in ♂♂. For variation in morphometric parameters see table 1.

REMARKS: *Pristimantis onorei* is known from Santo Domingo de Los Colorados, Pichincha, from Tandapi, Pinchincha, and from San Francisco de Las Pampas, Cotopaxi, Ecuador (MHNG 2710.24, MHNG 2710.25) (Fig. 5). Although the label attached to the specimen MHNG 2710.25 states that it was collected at Santa Domingo de Los Colorados, it remains unclear if the city at approximately 79.15°W , 0.25°S , 543 m a.s.l. was indicated or another place within the county Santo Domingo de Los Colorados (approximately $79.42 - 78.83^{\circ}\text{W}$, $0.04 - 0.51^{\circ}\text{S}$, 200-1700 m a.s.l.). *Pristimantis onorei* inhabits humid lowland tropical forest and cloud forest and possibly co-occurs with *P. floridus*. The species is presumed to breed by direct development as other members of the *myersi*-group. Its vocalization is unknown.

***Pristimantis lucidosignatus* sp. nov.**

Figs 3, 4, 6

Lightspot Robber Frog

HOLOTYPE: MHNG 2392.27, a ♀, collected at Tandapi, Pichincha, Ecuador, approximately 78.91° W, 0.54° S, 2,115 m a.s.l., by L. A. Coloma during December 1984.

PARATYPES: MHNG 2710.26 and MHNG 2710.27, both ♂♂, collected San Francisco de Las Pampas, Cotopaxi, Ecuador, approximately 78.96°W, 0.43°S, 1,711 m a.s.l., by G. Onore during April 1986.

ETYMOLOGY: Latin, *lucido*, meaning light, bright; and *signatus*, meaning sign. The specific name is referring to the flash spots on the shanks of the species.

DIAGNOSIS: The species can be assigned to the *Pristimantis myersi* species group *sensu* Hedges *et al.* (2008), see above. *Pristimantis lucidosignatus* has (1) skin on dorsum, upper flanks and limbs tubercular, that of venter finely areolate; well developed W-shaped occipital-scapular ridge, rest of dorsum covered with numerous interrupted dermal ridges; some large conical tubercles on upper eye lid and posterior parts of the tympanic region; dorsolateral and discoidal folds absent; (2) tympanum oval, supratympanic fold absent; (3) snout rounded to slightly subovoid in dorsal view, acuminate in profile; canthus rostralis concave, edge rounded; (4) upper eyelid with two to three prominent, conical tubercles and irregularly scattered smaller tubercles; (5) choanae small, elliptical; distinct dentigerous processes of vomers posterior and medial to choanae; tongue round, posterior 2/3 free, not notched behind, filling the whole mouth; (6) ♂♂ with short vocal slits and a external subgular vocal sac; (7) Finger I slightly shorter than Finger II; (8) fingers without lateral keels; (9) axillary tubercle absent; (10) ulnar tubercles present, not projecting; (11) calcars absent; (12) inner metatarsal tubercle elliptic, protruding, outer metatarsal tubercle half the size of inner metatarsal tubercle; (13) toes with weak lateral keels; no webbing; Toe IV with small round disc, twice the size of disc on Toes I, II, III, and V (Fig. 3); (14) in preservative, dorsal and dorsolateral ground color light brown with scattered dark spots, limbs dark banded, two darker subocular stripes radiating from lower eye lid to upper lip; ventral coloration light brown; anterior and posterior thigh surfaces uniform brown lacking spots; each shank with one flash spot; (15) SVL 17.0 mm in ♀, 21.6 and 22.0 mm in ♂♂.

Pristimantis lucidosignatus is unique among other *Pristimantis* of the *myersi* group in the following combination of characters: lack of narrow lateral fringes on fingers; prominent W-shaped dermal ridges extending from posterior part of upper eyelid to scapular region; presence of flash spots on shanks; no large cream spots on venter; anterior and posterior surfaces of thighs uniform light brown, prominent light markings on tibia.

COMPARISON WITH OTHER SPECIES (conditions of *P. lucidosignatus* in parenthesis): *Pristimantis leoni* has a partly concealed tympanum beneath the skin (completely visible), and cream spots on venter (absent). *Pristimantis ocreatus* has a reddish brown middorsal stripe or a broad dorsal band (absent), white spots on flanks and stomach, pale spots on surfaces of posterior thighs (uniform light brown). *Pristimantis pyrrhomerus* has no digital discs or pads on Finger II and Toe II (present). Furthermore,

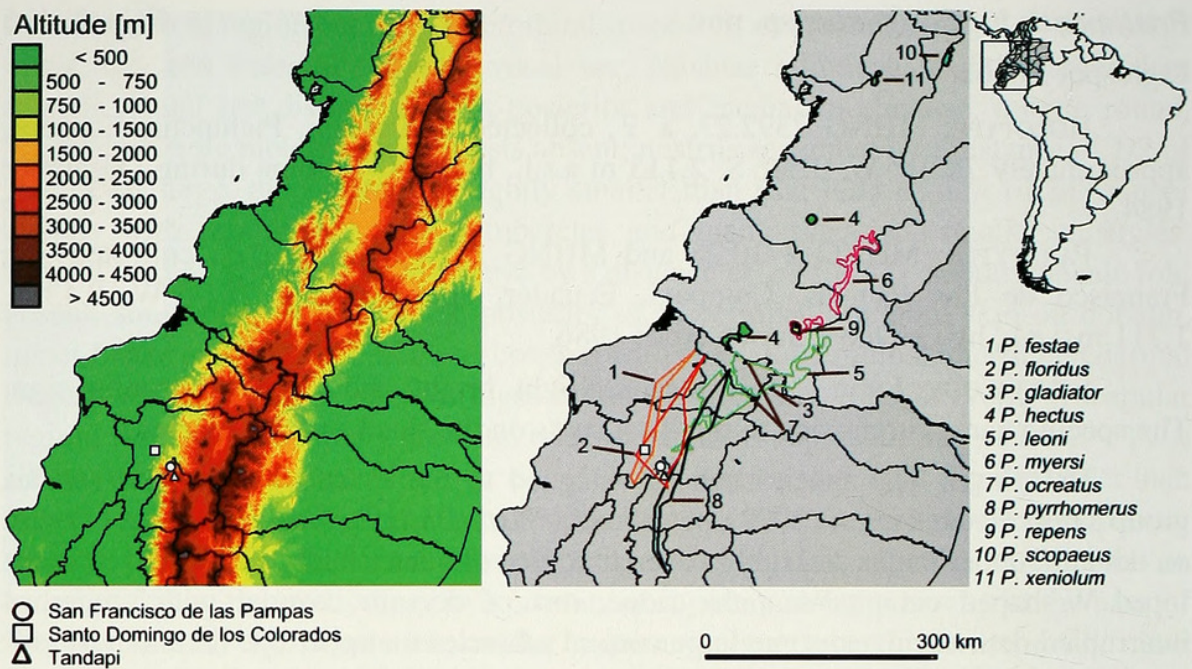


FIG 5

Map of the Andean slopes in Colombia and Ecuador with the type-locations of *Pristimantis onorei* sp. nov., *Pristimantis lucidosignatus* sp. nov., and the known ranges of the other members of the *P. myersi* group according to IUCN *et al.* (2006).

preserved specimens of *P. pyrrhomerus* have colorless areas in axial, groin and on anterior and posterior surfaces of thighs, which are bright red in life (only present in groin, posterior and anterior surfaces of thighs light brown), and a cream venter with brown reticulation (light brown with minute cream spots). *Pristimantis lucidosignatus* can be easily distinguished from *P. festae*, which has small finger discs (larger), white pots on venter, throat and in groin in preserved specimens (absent) and lacks dermal ridges on the dorsum (present). *Pristimantis floridus* has larger digital discs (smaller), vocal slits (lacking in males), small, pustular tubercles which are not larger than those on the rest of head (much larger), and a shagreen dorsum with many rounded warts (many dermal ridges). *Pristimantis gladiator* has small heel tubercles (absent), and *P. hectus* shows prominent dorsolateral folds (absent) and lacks upper eye lid tubercles (present). *Pristimantis leoni* has a partly concealed tympanum beneath the skin (not concealed, completely visible in males, absent in females), TD 43.9 – 45.2 % of ED (10.3 and 10.4 %), a supratympanic fold obscured by tubercles (absent), small tubercles on the heel (absent), cream spots on venter (absent), no cream spots at the upper shanks (present) and a brown barred throat (uniform brown). *Pristimantis onorei* sp. nov. has weakly developed W-shaped dorsal ridges (much stronger developed) and lacks light spots on shanks (present). *Pristimantis repens* has a finely shagreen to tuberculate dorsum lacking dermal ridges (present) and cream flecks on posterior thigh surfaces, throat, chest and anterior venter (no cream flecks). *Pristimantis xeniolum* has a shagreen dorsum lacking dermal ridges (present).

DESCRIPTION OF THE HOLOTYPE: Snout outline rounded in dorsal view, truncate in profile; head weakly distinct from body in dorsal view, HW 43.5 % SVL; canthus rostralis concave, distinct; nostrils slightly protuberant, directed laterally; loreal region

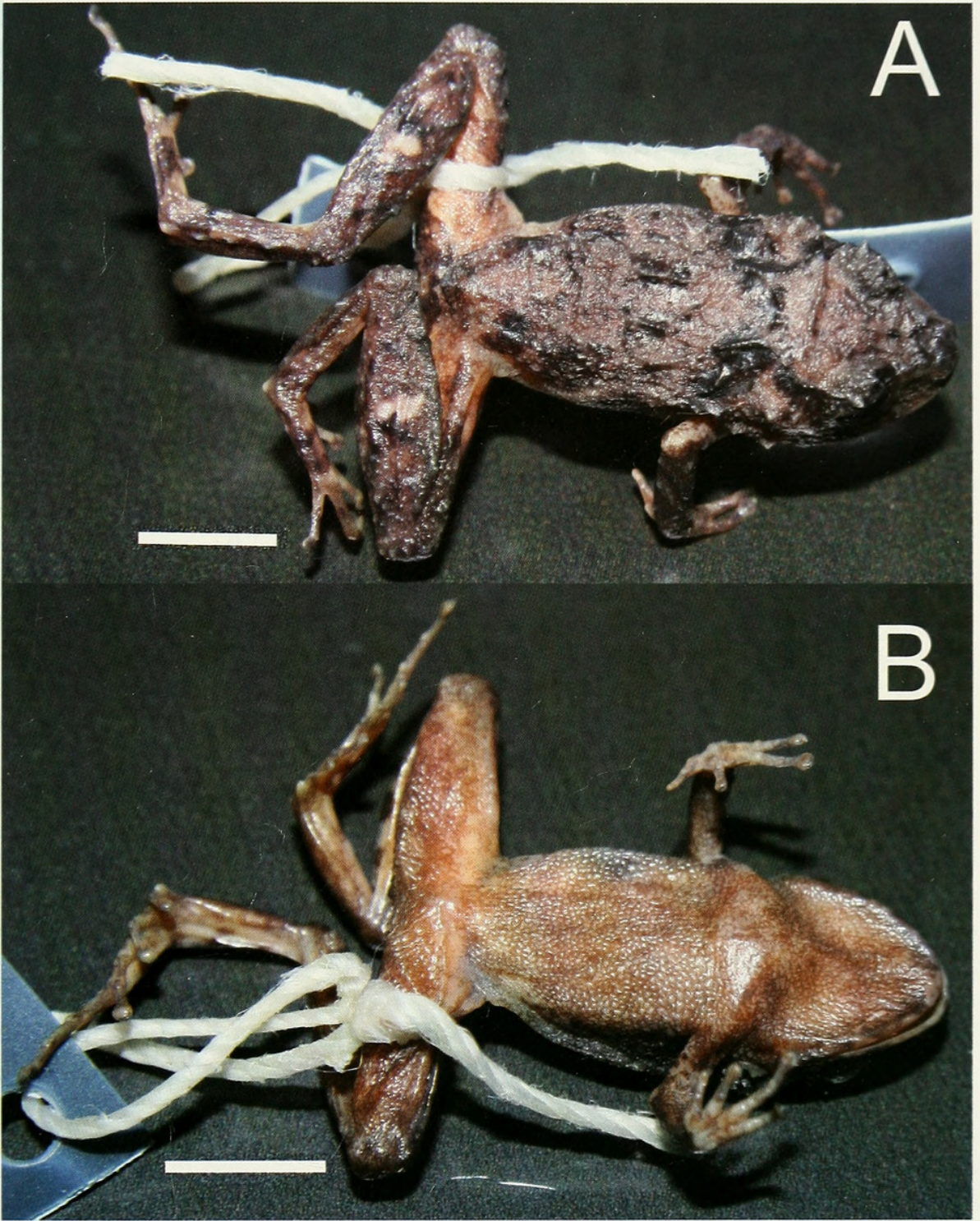


FIG. 6

Holotype of *Pristimantis lucidosignatus* sp. nov. (MHNG 2392.27) in dorsolateral (A) and ventral (B) view. Scale 10 mm.

concave, interorbital space flat, no cranial crests; choanae small, elliptical; distinct vomers posterior and medial to choanae; tongue round, posterior 2/3 free, not notched, filling the whole mouth; cranial crests absent; nostrils separated by a distance equal to IOD; eyes large, their diameter slightly smaller than EN; IOD 106.7 % of ED; upper eyelids with prominent, conical tubercles and many scattered, smaller tubercles;

tympanum completely concealed below the skin; supratympanic fold absent, more prominent spiny tubercles posterior to the tympanic region, which is somewhat swollen; skin on dorsum, upper flanks and limbs tuberculate, covered with many longitudinal interrupted dermal ridges; prominent W-shaped ridges extending from the posterior eyelid to scapular region; skin on venter areolate; relative length of adpressed fingers $I < II < IV < III$, not webbed, no lateral fringes or ridges, discs round, only slightly larger than phalanx of adjacent finger; largest disc on Finger III, discs on Finger I not larger than phalanx; palmar tubercle partly bifid, thenar tubercle elliptical and elongated, partly coalesced with palmar tubercle; subarticular tubercles as broad as finger, not protruding; some scattered small supernumerary tubercles; two small, not projected ulnar tubercles; relative length of adpressed toes $I < II < III < V < IV$, unwebbed, weak lateral fringes or ridges, discs round; disc of Toe IV equal in size to disc of Finger IV, those on other toes smaller; inner metatarsal tubercle protuberant, oval, larger than outer tubercle; outer metatarsal tubercle round, 1/2 of the size of inner metatarsal tubercle, protuberant; subarticular tubercles round, equal in size to toe width and slightly protruding; only one small supernumerary tubercle at base of Toe IV; calcars absent; TiL 58.2 % of SVL.

COLOURATION: In preservative, dorsal ground color uniform brown with scattered darker spots, often associated with dermal ridges; some more prominent darker markings along the W-shaped dermal ridge; flanks becoming lighter than dorsum ventrally; ventral coloration light brown; crossbars on the forearms and the shanks present; two cream spots at the upper shanks; anterior and posterior surfaces of thighs light brown without markings; anal triangle dark brown.

VARIATION: In ♂♂, tympanum distinct, oval, 10.3 – 10.4 % of ED, separated from the eye by a distance of 1/3 the TD. Tympanum absent in ♀♀. One specimen (MHNG 2710.26) with a thin, cream dorsal stripe extending from the tip of the snout to toe urostyle, stripe continues on the venter and is crossed by a thin stripe connecting both arm insertions (Fig. 4). The specimen has also a thin cream stripe running from knee to knee along the posterior thigh surfaces and cream stripes extending from tarsus to foot. For variations in morphometric parameters see table 1.

REMARKS: *Pristimantis lucidosignatus* is known from two specimens collected at San Francisco de Las Pampas, Cotopaxi, and one specimen collected at Tandapi, Pichincha, Ecuador (Fig. 5). It inhabits humid lowland tropical forest and cloud forest and possibly co-occurs with *P. floridus*. The species is presumed to breed by direct development as other members of the *myersi*-group. Its vocalization is unknown.

DISCUSSION

With 472 formally described amphibian species (442 Anura, 7 Caudata and 23 Gymnophiona) Ecuador has the third-greatest amphibian diversity after Brazil and Colombia. In Ecuador 39 % of the species are endemic (182 species), and most endemics can be found in the Andean region (75 %) (Coloma, 2005-2007). Generally, the Andes in Colombia, Ecuador, Peru and Bolivia as well as the upper Amazon region are distinguished in having a great number of species of strabomantid frogs (Coloma, 2005-2007; Hedges, *et al.*, 2008; Lynch & Duellman, 1997). With 155 species in Ecuador, members of this genus make up to 35 % of the anuran fauna (Coloma, 2005-

TABLE 1. Morphometric measurements of *Pristimantis onorei* sp. nov. and *Pristimantis lucidosignatus* sp. nov. [mm]. For abbreviations see text.

Specimen Sex	<i>Pristimantis onorei</i> sp. nov.				<i>Pristimantis lucidosignatus</i> sp. nov.		
	MHNG 2392.25 ♂	MHNG 2392.26 ♀	MHNG 2710.24 ♀	MHNG 2710.25 ♂	MHNG 2392.27 ♀	MHNG 2710.26 ♂	MHNG 2710.27 ♂
SVL	20.1	20.1	20.5	17.1	17.0	21.6	22.0
TiL	9.1	10.8	10.9	9.5	9.9	10.2	10.5
FeL	10.2	10.5	10.1	10.9	10.9	10.4	12.0
TaL	6.0	5.9	7.4	7.0	5.9	5.9	7.1
FL	9.4	9.4	11.4	9.6	9.6	10.1	10.1
HeL	7.4	7.6	7.4	8.2	5.0	7.1	8.0
HW	7.8	8.3	8.4	8.0	7.4	8.0	9.0
Ind	1.4	2.0	2.5	1.4	2.0	2.4	1.9
IOD	2.3	2.5	2.6	2.4	2.4	2.3	2.2
EN	2.3	2.4	2.5	2.3	2.2	2.4	2.4
ED	2.6	3.2	3.1	3.2	2.7	3.1	3.1
ETS	3.0	3.0	3.7	2.5	2.2	3.7	2.2
TD	0.7	0.8	0.8	0.7	-	0.3	0.3
TiL % of SVL	42.3	53.8	53.1	55.3	58.2	47.1	47.7
HeL % of SVL	36.8	37.8	36.1	47.6	29.2	32.8	36.3
HW % of SVL	38.8	41.4	41.1	46.7	43.5	37.2	40.8
TD % of ED	26.9	24.3	25.4	22.6	-	10.4	10.3
IOD % of ED	88.5	107.6	104.4	103.9	106.7	98.7	91.1

2007). Although many areas are comparatively well sampled (Lynch & Duellman, 1997), discovery of species new to science is still common and several species are discovered each year (Fig. 1).

Both new species described herein are members of the *Pristimantis myersi* species group as currently defined by Hedges *et al.* (2008). This group contains eleven species distributed in the in the Ecuadorian and Colombian Andes (Fig. 6): *Pristimantis festae* (Lynch, 1975; Peracca & Conte, 1904), *P. floridus* (Lynch & Duellman, 1997), *P. gladiator* (Lynch, 1976), *P. hectus* (Lynch & Burrowes, 1990), *P. leoni* (Lynch, 1976), *P. myersi* (Goin & Cochran, 1963), *P. ocreatus* (Lynch, 1981), *P. pyrrhomerus* (Lynch, 1976), *P. repens* (Lynch, 1984), *P. scopaeus* (Lynch *et al.*, 1996) and *P. xeniolum* (Lynch, 2001). Of these, only *P. festae*, *P. floridus*, *P. leoni* and *P. pyrrhomerus*, inhabiting distinct altitudinal bands, might potentially co-occur with the new species, but are readily distinguished from them. The frequent discovery of undescribed species of *Pristimantis* along the versants of the Andes in Ecuador during the last three decades suggests that the anuran diversity within these unique habitats may still be largely underestimated.

ACKNOWLEDGEMENTS

Cesar L. Barrio-Amorós, Wolfgang Böhme, Peter Janzen, Enrique La Marca, Annemarie Ohler and Andreas Schlüter kindly provided us access to specimens in their care and/or to literature. We thank Stefan Lötters and José Padial for many valuable suggestions. This work was partly funded by the “Graduiertenförderung des Landes Nordrhein-Westfalen”. The first author is grateful to the MHNG for financial support.

REFERENCES

- COLOMA, L. A. 2005-2007. Anfibios de Ecuador [en línea]. Ver. 2.0 (29 Nov. 2008). Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador. www.puce.edu.ec/zoologia/vertebrados/amphibiawebe/anfibiosecuador/index.html
- FROST, D. R., GRANT, T., FAIVOVICH, J., BAIN, R. H., HAAS, A., HADDAD, C. F. B., DE SÁ, R. O., CHANNING, A., WILKINSON, M., DONNELLAN, S. C., RAXWORTHY, C. J., CAMPBELL, J. A., BLOTTO, B. L., DREWES, R. C., NUSSBAUM, R. A., LYNCH, J. D., GREEN, D. M., & WHEELER, W. C. 2006. The amphibian tree of life. *Bulletin of the American Museum of Natural History* 297: 1-370.
- GOIN, C. J. & COCHRAN, D. M. 1963. Two new genera of leptodactylid frogs from Colombia. *Proceedings of the California Academy of Sciences* 31: 499-505.
- HEDGES, S. B., DUELLMANN, W. E. & HEINICKE, M. P. 2008. New world direct-developing frogs (Anura: Terrarana): molecular phylogeny, classification, biogeography, and conservation. *Zootaxa* 1737: 1-182.
- HEINICKE, M. P., DUELLMAN, W. E. & HEDGES, S. B. 2007. Major Caribbean and Central American frog faunas originated by ancient oceanic dispersal. *Proceedings of the National Academy of Science* 104: 10092-10097.
- IUCN, CONSERVATION INTERNATIONAL, & NATURESERVE. 2006. Global Amphibian Assessment. www.globalamphibians.org. Download 28. Nov. 2008.
- LA MARCA, E. 2007. Sinopsis taxonómica de dos géneros nuevos de anfibios (Anura: Leptodactylidae) de los andes de Venezuela. *Herpetotropicos* 3: 67-87.
- LYNCH, J. D. 1975. A review of the broad-headed eleutherodactyline frogs of South America (Leptodactylidae). *Occasional Papers of the Museum of Natural History, The University of Kansas, Lawrence, Kansas* 38: 1-46.
- LYNCH, J. D. 1976. Three new leptodactylid frogs (genus *Eleutherodactylus*) from the Andean Slopes of Colombia and Ecuador. *Herpetologica* 32: 310-317.
- LYNCH, J. D. 1981. Leptodactylid frogs of the genus *Eleutherodactylus* in the Andes of northern Ecuador and adjacent Colombia. *Miscellaneous Publication, University of Kansas, Museum of Natural History* 72: 1-46.
- LYNCH, J. D. 2001. A small amphibian fauna from a previously unexplored Paramo of the Cordillera Occidental in western Colombia. *Journal of Herpetology* 35: 223-231.
- LYNCH, J. D. & BURROWES, P. A. 1990. The frogs of the genus *Eleutherodactylus* (family Leptodactylidae) at the la Planada Reserve in southwestern Colombia with descriptions of eight new species. *Occasional Papers of the Museum of Natural History, The University of Kansas, Lawrence, Kansas* 136: 1-31.
- LYNCH, J. D. & DUELLMAN, W. E. 1997. Frogs of the genus *Eleutherodactylus* (Leptodactylidae) in western Ecuador: systematics, ecology, and biogeography. *Museum of Natural History, The University of Kansas, Lawrence, Kansas, Special Publication No. 23*: 1-236.
- LYNCH, J. D., RUIZ-CARRANZA, P. M. & ARDILA-ROBAYO, M. C. 1996. Three new species of *Eleutherodactylus* (Amphibia: Leptodactylidae) from high elevation of the Cordillera Central of Colombia. *Caldasia* 18: 329-342.
- PERACCA, M. & CONTE, G. 1904. Viaggia del Dr. Enrico Festa nell'Ecuador e regioni vicine. Rettili ed. Anfibi. *Bollettino dei Musei di Zoologia ed Anatomia Comparata della Reale Università di Torino* 19: 1-41.
- WELLS, K. D. 2007. The ecology and behavior of amphibians. The University of Chicago Press, Chicago.



Rodder, Dennis and Schmitz, Andreas. 2009. "Two new *Pristimantis* (Anura, Strabomantidae) belonging to the *myersi* group from the Andean slopes of Ecuador." *Revue suisse de zoologie* 116, 275–288.

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